

WE CLAIM:

1. A lubricating oil composition useful for diesel engine comprising:

a base oil; and

at least one oil-dispersible source of HNCO in an amount effective to reduce NOx emission from a diesel engine compared to a lubricating oil without the source of HNCO.

2. The lubricating oil composition of claim 1 wherein the oil-dispersible source of HNCO is an isocyanate.

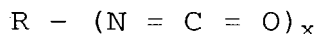
3. The lubricating oil composition of claim 2 wherein the isocyanate is present in an amount of at least about 0.1% by weight based on the weight of the lubricating oil composition.

4. The lubricating oil composition of claim 2 wherein the isocyanate is present in an amount of at least about 0.5% by weight based on the weight of the lubricating oil composition.

5. The lubricating oil composition of claim 1 wherein the source of HNCO is present in an amount of at least about 0.1% by weight based on the weight of the lubricating oil composition.

6. The lubricating oil composition of claim 1 wherein the source of HNCO is present in an amount of at least about 0.5% by weight based on the weight of the lubricating oil composition.

7. The lubricating oil composition of claim 2 wherein the isocyanate is a compound represented by the formula:



wherein R is a hydrocarbyl group having 4 to 30 carbon atoms, and x is an integer of 1 to 4.

8. The lubricating oil composition of claim 7 wherein the isocyanate is present in an amount of at least about 0.1% by weight based on the weight of the lubricating oil composition.

9. The lubricating oil composition of claim 8 wherein the isocyanate is present in an amount of at least about 0.5% by weight based on the weight of the lubricating oil composition.

10. The lubricating oil composition of claim 2 wherein the isocyanate is methylene diphenyl diisocyanate.

11. The lubricating oil composition of claim 5 wherein the isocyanate is methylene diphenyl diisocyanate.

12. The lubricating oil composition of claim 7 wherein x is 1 or 2.

13. The lubricating oil composition of claim 8 wherein x is 1 or 2.

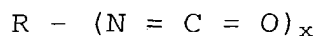
14. The lubricating oil composition of claim 1 further comprising an additive selected from the group consisting of oxidation inhibitors, dispersants, detergents, and mixtures thereof.

15. A lubricating oil composition useful for diesel engine comprising: a base oil; and at least one isocyanate having sufficient volatility to degas from the lubricating oil composition under normal engine operating conditions in an amount effective to reduce NOx emission from a diesel engine compared to a lubricating oil without the isocyanate.

16. The lubricating oil composition of claim 15 wherein the isocyanate is present in an amount of at least about 0.1% by weight based on the weight of the lubricating oil composition.

17. The lubricating oil composition of claim 16 wherein the isocyanate is present in a amount of at least about 0.5% by weight based on the weight of the lubricating oil composition.

18. The lubricating oil composition of claim 15 wherein the isocyanate is a compound represented by the formula:



wherein R is a hydrocarbyl group having 4 to 30 carbon atoms, and x is an integer of 1 to 4.

19. The lubricating oil composition of claim 18 wherein the isocyanate is present in an amount of at least about 0.1 % by weight based on the weight of the lubricating oil composition.

20. The lubricating oil composition of claim 19 wherein the isocyanate is present in an amount of at least about 0.5% by weight based on the weight of the lubricating oil composition.

21. The lubricating oil composition of claim 18 wherein x is 1 or 2.

22. The lubricating oil composition of claim 19 wherein x is 1 or 2.

23. The lubricating oil composition of claim 15 wherein the isocyanate is methylene diphenyl diisocyanate.

24. The lubricating oil composition of claim 16 wherein the isocyanate is methylene diphenyl diisocyanate.

25. The lubricating oil composition of Claim 15 further comprising an additive selected from the group consisting of oxidation inhibitors, dispersants, detergents, and mixtures thereof.

26. A method of operating a diesel engine comprising:

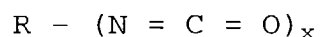
introducing into the diesel engine a lubricating oil composition; and

operating the engine,

wherein the lubricating oil composition comprises a base oil; and at least one oil-dispersible source of HNCO in an amount effective to reduce NO_x emission from a diesel engine compared to a lubricating oil without the source of HNCO.

27. The method of claim 26 in which the source of HNCO is an isocyanate.

28. The method of claim 27 wherein the isocyanate is a compound represented by the formula:



wherein R is a hydrocarbyl group having 4 to 30 carbon atoms, and x is an integer of 1 to 4.

29. The method of claim 26 wherein the oil-dispersible source of HNCO is present in an amount of at least about 0.1% by weight based on the weight of the lubricating oil composition.

30. The method of claim 26 wherein the oil-dispersible source of HNCO is methylene diphenyl diisocyanate.

31. The method of claim 29 wherein the source of HNCO is an isocyanate.

32. The method of claim 31 wherein the isocyanate is a compound represented by the formula:



wherein R is a hydrocarbyl group having 4 to 30 carbon atoms, and x is an integer of 1 to 4.

33. The method of claim 32 wherein x is 1 or 2.

34. A method of operating a diesel engine comprising: an engine body; a combustion chamber formed in the engine body for containing a mixture of fuel and air; a plurality of cylinders formed in the engine body;

and a respective piston mounted in each of said plurality of cylinders for reciprocal movement through successive exhaust and intake strokes, each respective piston defining a combustion chamber for containing a mixture of fuel and air the method comprising:

introducing, into the combustion chamber, diesel fuel and air;

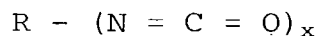
delivering a lubricating oil composition to said cylinders;

compressing the diesel fuel in the combustion chamber to ignition with the piston thereby generating an exhaust gas containing NO_x;

wherein the lubricating oil composition comprises a base oil and at least one oil-dispersible source of HNCO.

35. The method of claim 34 wherein the oil-dispersible source of HNCO is an isocyanate having sufficient volatility to degas from the lubricating oil composition under normal engine operating conditions.

36. The method of claim 35 wherein the isocyanate is a compound represented by the formula:



wherein R is a hydrocarbyl group having 4 to 30 carbon atoms, and x is an integer of 1 to 4.

37. The method of claim 36 wherein the isocyanate is present in an amount of at least about 0.1% by weight.

38. The method of claim 36 wherein the isocyanate is present in an amount of at least about 0.5% by weight.

39. The method of claim 36 wherein the isocyanate is methylene diphenyl diisocyanate.

40. The method of claim 34 in which the isocyanate is present in an amount of at least 0.1% by weight based on the lubricating oil composition.

41. The method of claim 34 in which the isocyanate is present in an amount of at least 0.5% by weight based on the lubricating oil composition.

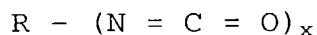
42. The method of claim 35 in which the isocyanate is present in an amount of at least 0.1% by weight based on the lubricating oil composition.

43. The method of claim 37 wherein x is 1 or 2.

44. A lubricating oil composition useful for diesel engine comprising:

a base oil; and

at least one isocyanate, represented by the formula:



wherein R is a hydrocarbyl group having 4 to 30 carbon atoms, and x is an integer of 1 to 4, present in amount of at least about 0.1% by weight to about 5% weight based on the lubricating oil composition.

45. The lubricating oil composition of claim 44 wherein x is 1 or 2.

46. The lubricating oil composition of claim 45 wherein the isocyanate is methylene diphenyl diisocyanate.

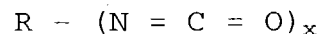
47. A method of operating a diesel engine comprising: an engine body; a combustion chamber formed in the engine body for containing a mixture of fuel and air; a plurality of cylinders formed in the engine body; and a respective piston mounted in each of said plurality of cylinders for reciprocal movement through successive exhaust and intake strokes, each respective piston defining a combustion chamber for containing a mixture of fuel and air the method comprising:

introducing, into the combustion chamber, diesel fuel and air;

delivering a lubricating oil composition to the cylinders;

compressing the diesel fuel in the combustion chamber to ignition with the piston thereby producing an exhaust gas;

wherein the lubricating oil composition comprises a base oil and at least one isocyanate, represented by the formula:



wherein R is a hydrocarbyl group having 4 to 30 carbon atoms, and x is an integer of 1 to 4, present in amount of at least about 0.1% by weight to about 5% weight based on the lubricating oil composition.

48. The method of claim 47 wherein x is 1 or 2.

49. The method of claim 48 wherein the isocyanate is methylene diphenyl diisocyanate.